

1 CLAIMS:

2 1. A communication device comprising:

3 a first antenna operable to receive wireless communication signals;

4 a second antenna having plural leads, the second antenna being
5 operable to output wireless communication signals;

6 a connection including plural conductive lines having respective
7 first ends and second ends, the connection being coupled with the leads
8 of the second antenna at the first ends of the lines; and

9 a switch coupled with the second ends of the connection, the
10 switch being operable to provide one of selective shorting and isolation
11 of the leads.

12
13 2. The communication device according to claim 1 wherein the
14 first antenna and the second antenna are separated by a distance
15 approximately equal to the wavelength of the wireless communication
16 signals.

17
18 3. The communication device according to claim 1 wherein the
19 connection comprises a transmission line.

20
21 4. The communication device according to claim 1 wherein the
22 connection has a length approximately equal to one quarter the
23 wavelength of the wireless communication signals.
24

1 5. The communication device according to claim 1 wherein the
2 switch is open during receiving of wireless communication signals via the
3 first antenna.

4
5 6. The communication device according to claim 1 wherein the
6 connection provides low load impedance of the second antenna during
7 receiving of wireless communication signals via the first antenna.

8
9 7. The communication device according to claim 1 wherein the
10 first antenna and second antenna are configured to beam form during
11 receiving of wireless communication signals.

12
13 8. The communication device according to claim 1 further
14 comprising a microprocessor coupled with the switch, the microprocessor
15 being operable to control the switch.

16
17 9. The communication device according to claim 1 further
18 comprising an integrated circuit comprising a microprocessor and a
19 transponder coupled with the first antenna and second antenna.

20
21 10. The communication device according to claim 1 wherein the
22 communication device comprises a wireless identification device.

11. The communication device according to claim 1 wherein the communication device comprises a radio frequency identification device.

12. A communication device comprising:

a first antenna operable to receive wireless communication signals;

a second antenna having plural leads operable to output wireless communication signals, the second antenna being selectively configured between a first load impedance and a second load impedance lower than the first load impedance;

a switch electrically coupled with the second antenna, the switch being selectively operable to close to electrically short the leads and open to electrically insulate the leads; and

a transformer intermediate the switch and the second antenna, the transformer being configured to effect the second load impedance of the second antenna responsive to the switch being open.

13. The communication device according to claim 12 wherein the switch is open during receiving of wireless communication signals via the first antenna.

14. The communication device according to claim 12 wherein the transformer provides the second load impedance of the second antenna during receiving of wireless communication signals via the first antenna.

15. The communication device according to claim 12 wherein the transformer has a length approximately equal to one quarter the wavelength of the wireless communication signals.

16. The communication device according to claim 12 wherein the switch is selectively opened and closed during outputting of the wireless communication signals.

17. The communication device according to claim 12 further comprising an integrated circuit including a transponder configured to receive and output wireless communication signals.

18. The communication device according to claim 17 wherein the switch is implemented within the integrated circuit.

19. The communication device according to claim 17 wherein the integrated circuit further comprises a microprocessor operably coupled with the switch, the microprocessor being configured to control the switch.

20. The communication device according to claim 12 wherein the first antenna and second antenna are configured to beam form during receiving of wireless communication signals.

2025.04.02 16:20:20

1 21. The communication device according to claim 12 wherein the
2 first antenna and the second antenna are separated by a distance
3 approximately equal to the wavelength of the wireless communication
4 signals.

5
6 22. The communication device according to claim 12 wherein the
7 communication device comprises a wireless identification device.

8
9 23. The communication device according to claim 12 wherein the
10 communication device comprises a radio frequency identification device.

11
12 24. A communication system comprising:
13 an interrogator; and
14 a communication device configured to communicate with the
15 interrogator, the communication device including: a first antenna operable
16 to receive wireless communication signals from the interrogator; a second
17 antenna operable to output wireless communication signals to the
18 interrogator; and a connection configured to provide a low load
19 impedance of the second antenna during receiving of wireless
20 communication signals using the first antenna.

21
22 25. The communication system according to claim 24 wherein the
23 communication system comprises a wireless identification system.

1 26. The communication system according to claim 24 wherein the
2 communication device comprises a radio frequency identification device.

3
4 27. The communication system according to claim 24 wherein the
5 communication device further comprises a switch coupled with leads of
6 the second antenna, the switch being open during receiving of wireless
7 communication signals using the first antenna.

8
9 28. The communication system according to claim 24 wherein the
10 first antenna and the second antenna are configured to beam form
11 during receiving of the wireless communication signals using the first
12 antenna.

13
14 29. The communication system according to claim 24 wherein the
15 first antenna and the second antenna are separated by a distance
16 approximately equal to the wavelength of the wireless communication
17 signals.

18
19 30. The communication system according to claim 24 wherein the
20 connection has a length approximately equal to one quarter the
21 wavelength of the wireless communication signals.

22
23 31. The communication system according to claim 24 wherein the
24 connection comprises a transmission line.

1 32. A communication device comprising:
2 a first antenna operable to receive wireless communication signals;
3 a second antenna operable to output wireless communication
4 signals; and
5 a connection configured to provide a low load impedance of the
6 second antenna during receiving of wireless communication signals using
7 the first antenna.
8

9 33. The communication device according to claim 32 wherein the
10 communication device comprises a radio frequency identification device.
11

12 34. The communication device according to claim 32 further
13 comprising a switch coupled with leads of the second antenna, the
14 switch being open during receiving of wireless communication signals
15 using the first antenna.
16

17 35. The communication device according to claim 32 wherein the
18 first antenna and the second antenna are configured to beam form
19 during receiving of the wireless communication signals using the first
20 antenna.
21

22 36. The communication device according to claim 32 wherein the
23 first antenna and the second antenna are separated by a distance
24 approximately equal to the wavelength of the wireless communication signals.

1 37. The communication device according to claim 32 wherein the
2 connection has a length approximately equal to one quarter the
3 wavelength of the wireless communication signals.

4
5 38. The communication device according to claim 32 wherein the
6 connection comprises a transmission line.

1 39. A radio frequency identification device comprising:
2 a substrate;
3 a first antenna borne by the substrate, the first antenna being
4 operable to receive wireless interrogation signals;
5 a second antenna borne by the substrate and having plural leads,
6 the second antenna being operable to output wireless identification
7 signals responsive to reception of wireless interrogation signals, the first
8 antenna and the second antenna being separated by a distance
9 approximately equal to the wavelength of the wireless interrogation and
10 identification signals;
11 a transmission line connection including plural conductive lines
12 having respective first ends and second ends, the transmission line
13 connection having a length of approximately one quarter the wavelength
14 of the wireless interrogation and identification signals and being coupled
15 with the plural leads of the second antenna at the first ends of the
16 conductive lines, the transmission line connection being further operable
17 as a transformer to transform a high load impedance of the second
18 antenna to a low load impedance; and
19 an integrated circuit including a microprocessor, transponder
20 circuitry and a switch, the switch being coupled with the second ends
21 of the conductive lines of the transmission line connection, the
22 microprocessor operable to control the switch to provide shorting of the
23 leads during receiving of the wireless interrogation signals and selective
24

1 isolation of the leads during outputting of the wireless identification
2 signals.

3
4 40. A method of communicating comprising:
5 forming a first antenna;
6 forming a second antenna;
7 receiving wireless interrogation signals using the first antenna;
8 opening a coupling intermediate plural leads of the second
9 antenna during the receiving;
10 providing a low load impedance of the second antenna during the
11 receiving;
12 outputting wireless identification signals using the second antenna;
13 and
14 selectively shorting the leads of the second antenna during the
15 outputting.

16
17 41. The method according to claim 40 wherein the opening of
18 the coupling and shorting of the leads comprises opening and shorting
19 using a switch.

20
21 42. The method according to claim 40 wherein the providing
22 comprises coupling a transformer with the second antenna.
23
24

1 43. The method according to claim 42 wherein the transformer
2 has a length approximately equal to one quarter the wavelength of the
3 wireless communication signals.

4
5 44. The method according to claim 40 further comprising beam
6 forming using the first antenna and second antenna during the receiving.

7
8 45. The method according to claim 40 further comprising:
9 processing the wireless interrogation signals; and
10 generating wireless identification signals responsive to the
11 processing.

12
13 46. The method according to claim 40 further comprising spacing
14 the antennas at a length approximately equal to the wavelength of the
15 wireless communication signals.

16
17 47. A method of communicating comprising:
18 forming a first antenna;
19 receiving wireless communication signals using the first antenna;
20 forming a second antenna;
21 outputting wireless communication signals using the second antenna;
22 and
23 beam forming during the receiving using the first antenna and the
24 second antenna.

1 48. The method according to claim 47 further comprising
2 transforming a first load impedance of the second antenna to a second
3 load impedance less than the first load impedance.

4
5 49. The method according to claim 48 wherein the transforming
6 further comprises transforming using a transmission line.

7
8 50. The method according to claim 49 wherein the transmission
9 line has a length approximately one quarter the wavelength of the
10 wireless communication signals.

11
12 51. The method according to claim 47 further comprising
13 opening a coupling intermediate plural leads of the second antenna
14 during the receiving.

15
16 52. The method according to claim 47 further comprising
17 providing a low load impedance for the second antenna during the
18 receiving.

19
20 53. The method according to claim 47 further comprising
21 changing the load impedance of the second antenna during the
22 outputting.

1 54. The method according to claim 47 wherein the formations of
2 the first antenna and the second antenna comprise forming the first
3 antenna apart from the second antenna a distance of about the
4 wavelength of the wireless communication signals.

5
6 55. A method of communicating comprising:
7 providing a first antenna and a second antenna;
8 receiving wireless communication signals via the first antenna;
9 outputting wireless communication signals via the second antenna;
10 and
11 providing a low load impedance of the second antenna during the
12 receiving.

13
14 56. The method according to claim 55 further comprising
15 opening a coupling intermediate leads of the second antenna during the
16 receiving.

17
18 57. The method according to claim 55 further comprising
19 changing between a high load impedance and a low load impedance of
20 the second antenna during the outputting.

21
22 58. The method according to claim 55 wherein the providing
23 comprises transforming high load impedance of the second antenna to
24 low load impedance.

1 59. The method according to claim 58 wherein the transforming
2 further comprises transforming using a transmission line.
3

4 60. The method according to claim 59 wherein the transmission
5 line has a length approximately one quarter the wavelength of the
6 wireless communication signals.
7

8 61. The method according to claim 55 further comprising beam
9 forming using the first antenna and second antenna during the
10 receiving.
11

12 62. The method according to claim 55 wherein the providing the
13 antennas comprises forming the first antenna apart from the second
14 antenna a distance of about the wavelength of the wireless
15 communication signals.
16
17
18
19
20
21
22
23
24

1 63. A method of communicating within a radio frequency
2 identification device comprising:

3 forming a forward link antenna upon a first surface of a
4 substrate;

5 forming a return link antenna upon the first surface of the
6 substrate;

7 receiving wireless communication signals via the forward link
8 antenna;

9 outputting wireless communication signals via the return link
10 antenna responsive to the receiving;

11 spacing the forward link antenna and the return link antenna a
12 distance of approximately one wavelength of the received and outputted
13 wireless communication signals;

14 switching the impedance of the return link antenna during the
15 outputting using a switch coupled with plural leads of the return link
16 antenna;

17 opening the switch during the receiving;

18 transforming the load impedance of the return link antenna during
19 the receiving using a transmission line having a length of approximately
20 one quarter the wavelength of the received and outputted wireless
21 communication signals; and

22 beam forming using the forward link antenna and the return link
23 antenna.
24